

## Changing Status and Trends of Agriculture Development a Study of Bhopal District (Madhya Pradesh)

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**Abstract:** This paper exploring the growth performance of agriculture in Bhopal district of Madhya Pradesh State. This is founded that in Bhopal district irrigated area increased by 16 percent between the years 2000-01 to 2017-18. Due to which cropping intensity in the district has increased to 192.4 percent (meaning two crops are grown in the district every year). The main crops grown in the district are wheat and soybean. The area under wheat crop increased by 2.21 per cent and soybean crop by 1.28 per cent during 2000-01 to 2017-18. During this time soybean production increased by 0.24 per cent and wheat by 7.16 per cent. The reason for the increase in area under these crops is the availability of support price, reduced risk of yield.

### INTRODUCTION

Agriculture is the backbone of Indian economy. About 48.85 per cent of the work force employed in agriculture and contribute about 18 per cent of the gross value addition (GVA by agriculture and allied) in gross national value addition (GVA) during the 2017-18 (GoI, 2020). It is well established fact that there are widespread variation in the level of agricultural development and overall economic development between different parts of the country (Singh *et. al.*, 2013; Singh and Kaur, 2018; Singh *et. al.* 2020). The Madhya Pradesh state had made some noteworthy progress in agriculture front (Gulati *et al.* 2017; Singh *et. al.* 2018; Singh *et. al.* 2019).

The Indian economy has always been an agricultural economy. To meet the food needs of the post-independence population of the country did not produce sufficient food grains. Due to which the population of the country was struggling with the problem of hunger and malnutrition. Initially the government imported food grains to meet the food needs. But this was not a permanent solution, as at that

time the grain importing country had to abide by strict conditions. It was impossible to meet such conditions. The government launched programs to make the country self-sufficient in food grains. As a result of these programs, the country has become self-sufficient in foodgrains to some extent. But these programs created inequality in the development of the agricultural sector in the country. (Dreze *et al.*, 2006; Singh and Kaur, 2018; Singh *et al.*, 2018; Singh *et al.*, 2013) On the one hand, some states of the country like Punjab, Haryana, Uttar Pradesh, etc., agriculture has developed considerably. However, the growth rate in other states has been very low. Even in the backward states, a large number of people depend on agriculture for their livelihood. Therefore, it cannot be overlooked. (Chand & Parappurathu, 2012; Datt & Ravallion, 1998). The state of Madhya Pradesh has 19 per cent of the total area of the country. Despite having a large area of land, the state has not been able to contribute much to the country's food security. The state achieved an agricultural growth rate of 9.5 per cent between 2005-06 and 2014-15 (Singh, Singh & Singh, 2018). The main crops grown in the district are wheat and soyabean (Singh, Singh and Banoo, 2020).

Bhopal district is the capital of the Madhya Pradesh state, the district predominantly agrarian economy, this sector contributing about 8.84 per cent of gross value added to the district economy (National accounts 2016-17, CSO). About 55 per cent of the geographical area of the district coverage under agriculture and about half gross cropped area under insured irrigation. The present study conducted to analyse the growth performance of the agriculture sector of the district. The paper analyse the land use pattern of the district. Furthermore, the study focused on the growth performance of area, production and yield of the major crops in Bhopal district.

The present paper studies the performance of the agricultural sector in Bhopal, the capital of Madhya Pradesh. During the last 2000-2018 district gross cropped area, net sown area, gross irrigated area, cropping intensity, irrigation coverage and agriculture coverage have been studied. How the cropping pattern has changed in the district in the past and how the growth rate (area, production and yield) of this area has been.

## DATA METHODOLOGY

The present study is based on the secondary data collected for the period of 2000-01 to 2017-18 of Bhopal district of Madhya Pradesh. In this study selection of crops are based on the area coverage, so the selected three crops are covering more than 90 per cent of the gross cropped area of the selected district. Three major crops (Soyabean, Gram, and Wheat) have been selected for further analyses. We

compile data on land use and area, production and yield of selected crops. The data compiled from various published statistical sources like Statistical Abstract Madhya Pradesh, Economics and Statistics Director (DES of Madhya Pradesh State); Area, Production and Yield Statistics, Directorate of economics and statistics India. The study period was divided into two parts viz., Period-I 2000-01 to 2008-09, period-II 2009-10 to 2017-18.

### GROWTH RATE ANALYSIS

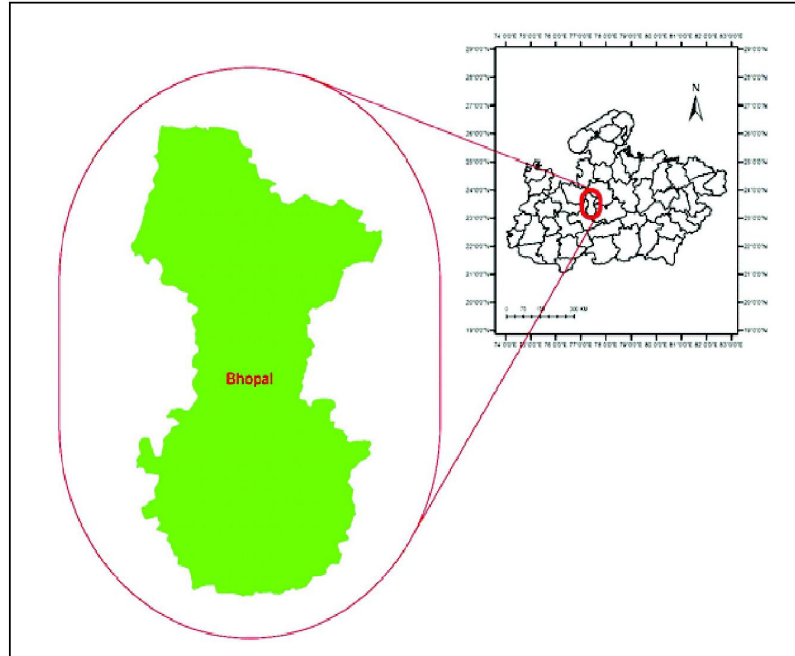
The compound growth rate of area, production and yield for selected crops are estimated for selected periods of time. The crop-wise compound growth rates are estimated to study the growth with the following exponential model.

$$Y = ab^t$$

Where

Log Y = log a + t log b (by taking the log of both sides)

CGR = (Antilog b-1) x 100



**Map 1: Study area location map**

Where, t = time period in year

Y = area/production/productivity

a & b = Regression parameters and

CGR = Compound growth rate.

The present study focused on the Bhopal district of the Madhya Pradesh state shown in map 1. Madhya Pradesh is the central state of the nation and the selected area of study is also central district of the state.

## RESULTS AND DISCUSSION

As all know that agriculture is the important sector in Madhya Pradesh in general and Bhopal district particularly. The development of the agriculture sector depended on the availability and quality of natural resources i.e land and water. Agricultural developed states like Punjab, Haryana and western part of Uttra Pradesh were

**Table 1: Land use and Agricultural performance in Bhopal over time**

<i>Year</i>	<i>Gross Cropped Area (000 ha)</i>	<i>Net Area Sown (000 ha)</i>	<i>Gross irrigated area (000 ha)</i>	<i>Cropping Intensity %</i>	<i>Irrigation Coverage %</i>	<i>Agriculture Coverage %</i>
2000-01	201	150	65	133.9	32.5	53.9
2001-02	211	153	68	137.7	32.4	55.1
2002-03	201	151	64	133.1	31.8	54.4
2003-04	215	152	77	140.8	35.7	54.9
2004-05	219	153	80	142.9	36.4	55.2
2005-06	222	154	86	144.6	38.5	55.4
2006-07	225	153	89	146.9	39.4	55.2
2007-08	226	153	89	148.2	39.3	54.9
2008-09	232	152	88	152.9	38.1	54.6
2009-10	238	153	94	155.4	39.7	55.1
2010-11	243	155	96	156.8	39.5	55.8
2011-12	242	155	97	156.0	40.1	55.8
2012-13	246	156	102	158.1	41.5	56.0
2013-14	248	155	103	159.3	41.4	55.9
2014-15	242	153	107	158.0	44.4	55.1
2015-16	230	151	104	152.0	45.4	54.4
2016-17	230	152	106	151.4	46.1	54.6
2017-18	245	153	139	160.1	47.0	55.1

*Source:* Land use statistics, Directorate of economics and statistics, ministry of agriculture, Govt. of India.

endowed with such resources which helped them to develop their agriculture. As studied by Singh et. al 2018, the Madhya Pradesh state was performed noteworthy in the agriculture sector during the last two decades. Bhopal is one of the important districts of the state and the performance of agriculture was also impressive in this area. Resulting, everyone has seen, the improvement in agriculture development indicator over time.

Table 1 shows the land use and agriculture performance in Bhopal district from the year 2000-01 to 2017-18. The gross cropped area in the district increased by 94 (000) hectares during the period 2000-01 to 2017-18. The gross cropped area increased in the first 17 years from 2000-01 to 2014-15 by 41(000) hectares. No major changes were seen in the net area sown. But the gross irrigated area has more than doubled during this period, probably due to the government spending more from its budget, giving more importance to irrigation facilities.

Irrigation coverage in the district has increased by 15 percent in 16 years and the area under irrigation in the district has increased, making it possible to grow more than one crop in the district. The cropping intensity of the district in the year 2017-18 is 160.1 percent. During the year 2000-01, the agriculture coverage was 53.9 per cent which increased to 55.1 per cent in the year 2017-18, during this period the agriculture coverage increased by 2.1 per cent. This was due to development of irrigation facilities in the district.

**Table 2: Growth rate of Net sown area, Gross cropped area and Gross irrigated area in Bhopal district**

Particular	Growth rate %		
	2000-01 to 2008-09	2009-10 to 2017-18	2000-01 to 2017-18
Net Area Sown	0.14	-0.21	0.06
Gross Cropped Area	1.78	0.96	1.38
Gross irrigated area	4.74	3.44	3.54

Source: estimated by authors

Table 2 shows the growth rate of the Bhopal district in the net sown area, gross cropped area, and gross irrigated area. For the future analysis the overall time divided into two parts i.e. 2000-01 to 2008-09 and 2009-10 to 2017-18. Between 2000-01 and 2008-09, the growth rate of net sown area was 0.14 per cent. But the growth has been founded negative in recent times (2009-10 to 2017-18), in case of net area

sown. But overall, between 2000-2001 and 2017-18, it was founded marginal (0.05 per cent). Gross cropped area grew by 1.78 per cent between 2000-01 and 2008-09, 0.96 per cent per annum during 2009-10 to 2017-18, and 1.38 per cent overall study period. The growth rate of gross irrigated area has founded 4.74 per cent during first time period (2000-01 to 2008-09), followed by 3.44 per cent during 2008-09 to 2017-18, and during overall study period it was grown at 3.54 per cent per annum rate.

The growth rate of irrigated area is very important indicator of agricultural development and improvement in insured irrigation pulls the more intensive agriculture practices. It also promoting use of modern agriculture inputs such as fertiliser and high variety of seed. Resulting, as seen in table 1, the cropping intensity is improving over time in the Bhopal district.

**Table 3: Changing cropping pattern in Bhopal district over time**

<i>Crop/crop group</i>	<i>% area Under Crop</i>				
	<i>2000-01</i>	<i>2005-06</i>	<i>2010-11</i>	<i>2015-16</i>	<i>2017-18</i>
Rice	0.33	0.26	0.19	1.10	1.71
Jowar	0.71	0.79	0.10	0.00	0.01
Maize	1.08	1.28	1.10	1.00	0.54
Wheat	30.50	31.22	31.00	38.28	44.14
Gram	15.58	15.79	15.04	10.17	7.42
Arhar (Tur)	0.46	0.44	1.07	0.86	0.24
Sugarcane	0.35	0.16	0.11	0.09	0.01
Fruits and Vegetable	1.39	1.50	1.22	1.51	0.58
Groundnut	0.11	0.19	0.13	0.16	0.18
Sesamum	0.05	0.08	0.02	0.03	0.05
Rapeseed and Mustard	0.07	0.08	0.03	0.02	0.03
Linseed	0.26	0.15	0.04	0.01	0.01
Soyabean	40.87	40.73	43.95	40.83	44.20
Other crop	8.24	7.32	5.99	5.92	0.91
Gross cropped area (Ha)	200537	222493	243011	229901	294685

*Source:* estimated by authors

Wheat (30.50 per cent), gram (15.58 per cent) and soyabean (40.87 per cent) are the most cultivated crops in Bhopal district (Table 3). The area under wheat crop increased from 30.50 per cent in 2000-01 to 44.14 per cent in 2017-18, an increase



of about 14 per cent point during study period. The area under soybean crop has increased from 40.87 per cent to 44.22 per cent. The area under these two crops has increased dramatically. The increase in acreage in these crops is due to the support price of the crops and low risk. Another reason for the increase in acreage under these crops is the development of irrigation facilities and favourable climate conditions.

The area under the third major crop gram was 15.58 per cent in 2000-01 which has come down to 7.42 per cent in 2017-18 due to declining production under this crop. Like other districts of Madhya Pradesh, the area under other crops in Bhopal district has decreased by less than 1 percent due to low yield, high risk and non-receipt of support price. It has also been observed that the area under paddy has increased five times due to support price, higher yield, GI tag(Geographical indication tagging scheme) by the central government etc. However, paddy is grown only in areas where irrigation facilities are available. The area under paddy is expected to increase in the near future.

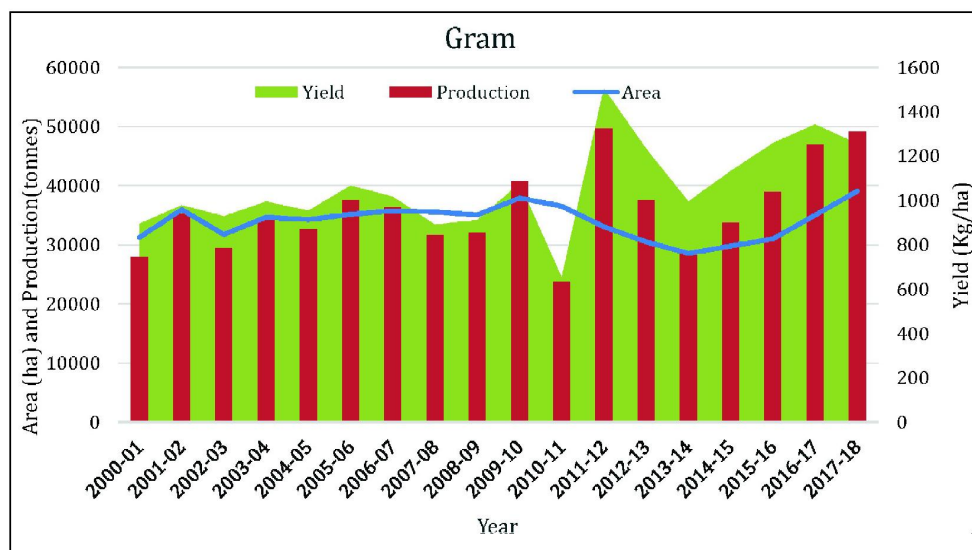
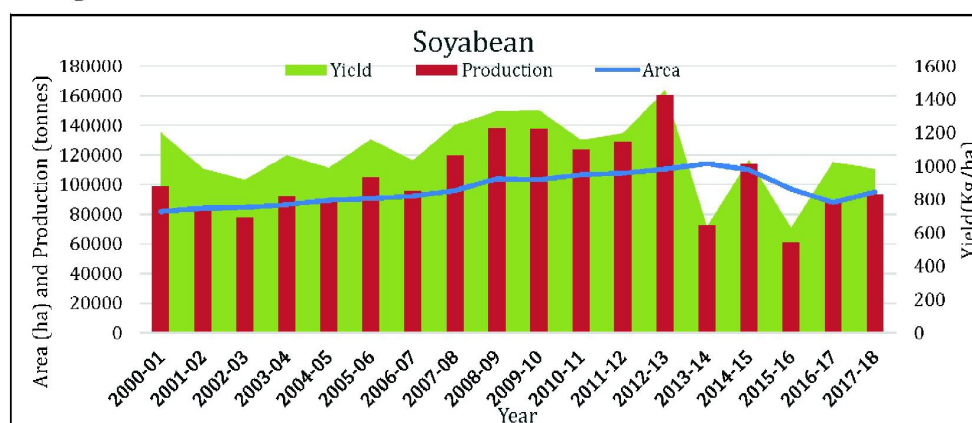


Figure 1: Trends of Area, Production and Yield of Gram in Bhopal District

Figure 1 showing the area, production, and Yield of Gram crop in the Bhopal district over the study period. Area of gram crop almost stable till 2009-10 (about 37 thousand ha) afterword's it founded decrease trend. But after 2015-16 area under gram reported again increase. Resulting the production of gram also increase due to

increase in area and yield. The main reason for decreasing area under gram was the fluctuation in yield. As seen in the figure that the yield of gram was decreasing during 2012-13 and 2013-14 which demoralized for farmers to allocate more area to this crop. Resulting area under crop decreased during this time period.

Figure 2 showing the area, production, and Yield of soyabean crop in the Bhopal district over the study period. Area of soyabean crop was reporting increasing trend till 2012-13. Afterward, the unexpected decline in yield comes down to the production of soyabean in Bhopal. Consequently, area allocation to soyabean crop comes down during 2013-14 to 2017-18.



**Figure 2: Trends of Area, Production and Yield of Soyabean in Bhopal District**

Wheat is very important crop for Madhya Pradesh. Figure 3 showing the area, production, and Yield of Wheat crop in the Bhopal district over the study period. Area of wheat crop was reporting marginal increasing over the time. However, the production of wheat was founded increased trend after 2010-11 in Bhopal district. This was due to increase in yield. Yield of wheat was increase from 24.4 (qtl/ha) in 2010-11 to 29.2 (qtl/ha) in 2017-18. Resulting, wheat production increase from 1.47 lakh MT in 2010-11 to 2.36 lakh MT 2017-18.

Table 4 shows the area, production and yield growth rate of selected crops. In 2000-01 and 2008-09 the area under Gram crop increased by 1.4 per cent between. During this period, production also by increased by 1.22 per cent. The growth in gram crop production was 3.70 per cent between 2009-10 and 2017-18. The area under the crop decreased by -0.26 per cent during this period, but the increase in production could be due to the use of HYV seeds, increased fertilizer, use of sprays and favourable climate.



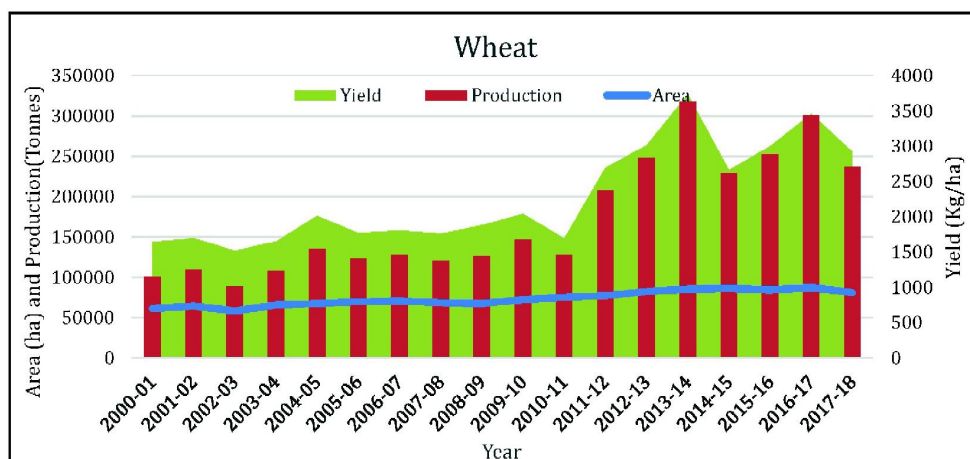


Figure 3: Trends of Area, Production and Yield of Wheat in Bhopal District

Table 4: Growth performance of Area, Production and Yield of selected crops in Bhopal district

Crop	Time period	Growth rate %		
		Area	Production	Yield
Gram	2000-01 to 2008-09	1.14	1.22	0.08
	2009-10 to 2017-18	-0.26	3.70	3.97
Soyabean	2000-01 to 2017-18	-0.15	1.77	1.93
	2000-01 to 2008-09	2.66	5.13	2.41
	2009-10 to 2017-18	-1.85	-6.97	-5.22
Wheat	2000-01 to 2017-18	1.28	0.24	-1.02
	2000-01 to 2008-09	1.67	3.51	1.80
	2009-10 to 2017-18	1.88	8.30	6.30
	2000-01 to 2017-18	2.21	7.16	4.84

Source: estimated by authors

The increase in area under wheat crop was observed in the whole period from 2000-01 to 2017-18. During this period, the area under wheat crop increased by 2.21 per cent and production increased by 7.16 per cent. The reasons for the increase in area under this crop are low risk in crop yield, support price etc. The area under soybean crop also increased in the first interval but decreased by -1.85 per cent in the next interval (2009-10 to 2017-18). Production under this crop has also declined

due to area reduction since 2009. The main reasons for the decline in area under cultivation were uncertainty of crop yield, minimum support price and the entire state was declared a drought area during this period. The yield of gram crop and wheat crop increased from 2009-10 to 2017-18 (3.97 per cent and 6.30 per cent).

## CONCLUSION

In Bhopal district between 2000-01 to 2017-18 gross cropped area increased by 94 (000ha), gross irrigated area more than doubled, cropping intensity 160.1 percent, irrigation coverage increased by 16 percent. Even today the area under irrigation in Bhopal district is much less than that of the agriculturally advanced state. As in Punjab, the irrigated area is 95 percent. Therefore irrigation is essential for the development of agriculture in the district because the use of fertilizer is possible only if there is irrigation facility. The area under wheat, soybean and gram in the district was about 95 percent in the year 2000-01. However, the year 2017-18 did not see much change in area. It is learned here that the area under wheat and soybean crop increased during this period as compared to the previous period. The reasons for increase in area under these crops are support price reduction, risk reduction and climate adaptation. However, the area under gram crop has decreased. The area under other crops is nominal

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